

SCOTTISH ELECTIONS 3 MAY 2007 REJECTED BALLOT PAPER ANALYSIS

Comparison of Electoral Regions Preliminary Analysis

This document presents some basic data for the eight Electoral regions, calculated as averages over the Constituencies within each Electoral region, and charts showing the relationships between Percentage Rejected Regional Ballot Papers and Percentage Rejected Constituency Ballot Papers. This preliminary analysis is presented as a “health warning” to demonstrate the need for care and caution in analysing and interpreting the data relating to rejected ballot papers and associations with possible contributory factors.

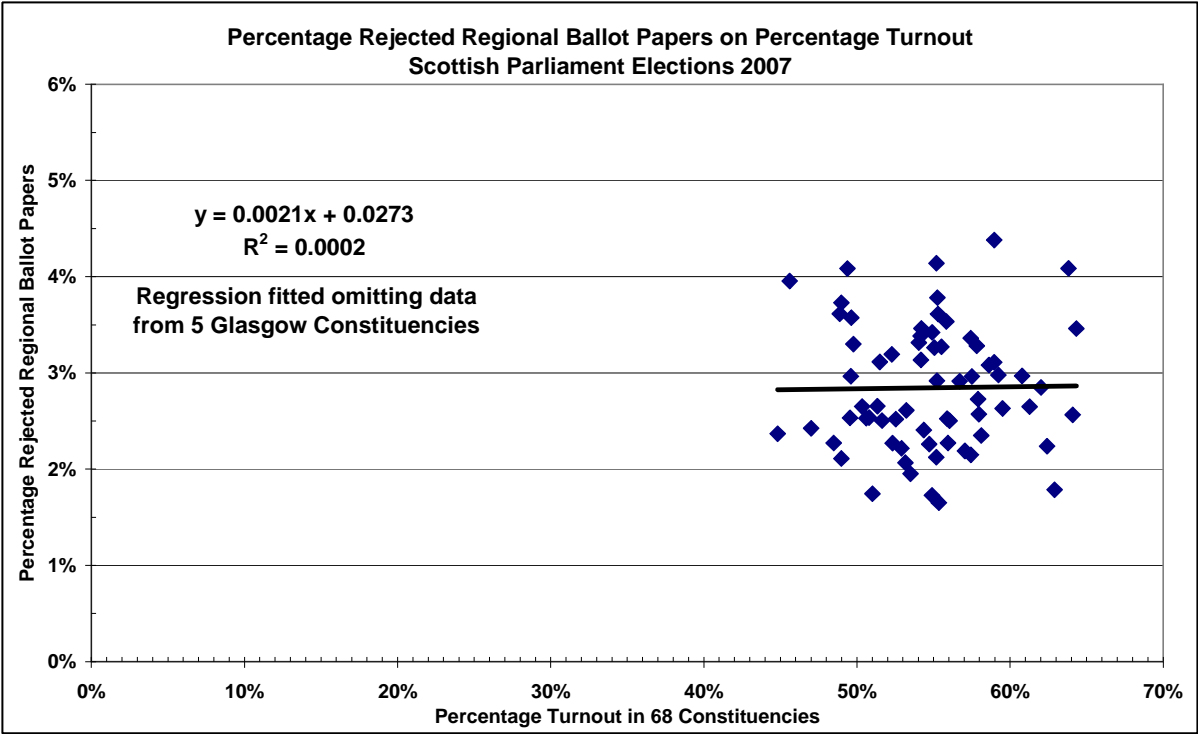
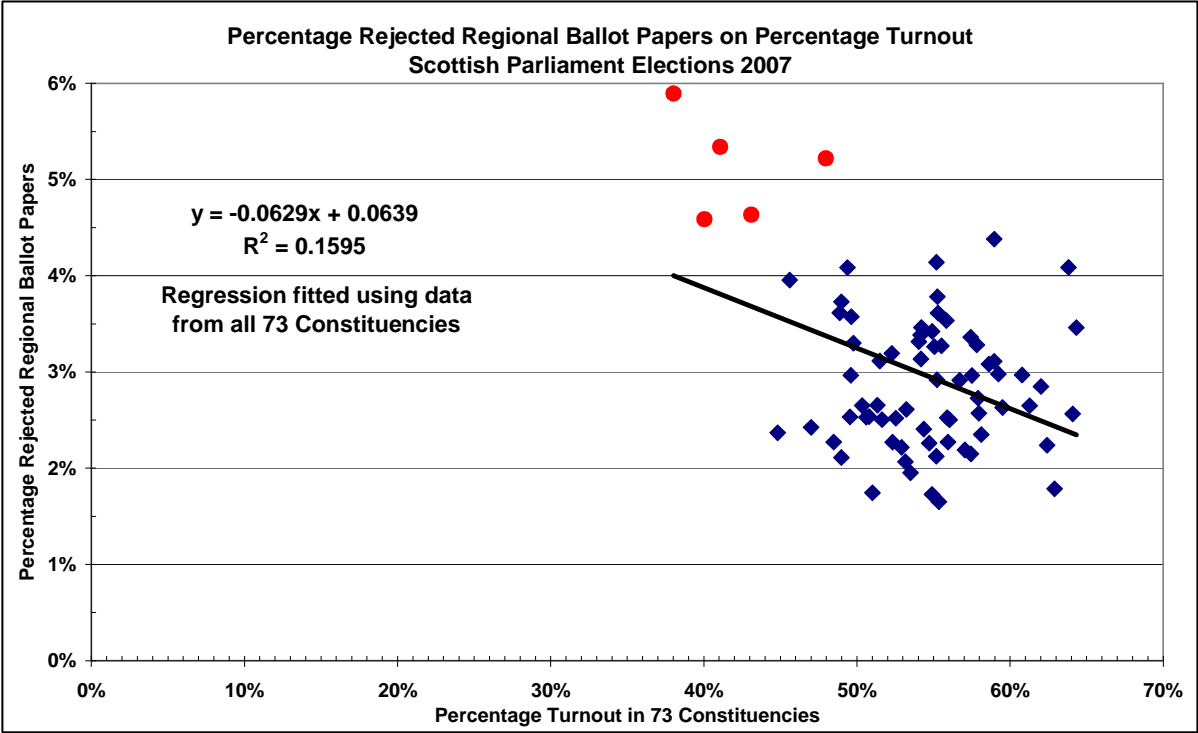
The data used here are for “rejected ballot papers” (as defined in the relevant legislation) and were confirmed from the Electoral Commission’s website. It is unfortunate that these “rejected ballot papers” have been described as “spoilt ballot papers”, both in the media and by official organisations, including the Electoral Commission. “Spoilt ballot papers” are also defined in the relevant legislation and are completely different from “rejected ballot papers”. Perhaps this distinction did not matter much in the past, but it is very important in the analysis of what happened in the 2007 elections. A separate analysis of the “spoilt ballot papers” *sensu stricto* would provide additional information about how voters reacted to the combined ‘ballot sheet’ and about the mistakes they recognised they had made in voting.

Many of the rejected ballot papers were rejected because they were blank, especially the constituency ballot papers. Such papers were correctly rejected, but it is important to recognise that by no means all of the papers rejected because they were unmarked indicate mistakes made by voters. In these elections, as in previous Scottish Parliament elections, a significant number of voters deliberately did not mark the constituency vote. This is most likely to have been done when the voter’s favoured party contested the region but not the constituency. To describe such a ballot paper as “spoilt” is completely wrong and unhelpfully misleading.

The Regional averages shown in the table on page 4 were calculated by analysis of variance that automatically adjusts for the unequal numbers of constituencies within the electoral regions. Two classification factors were included in the analysis of variance: ballot paper design (2 levels: “no arrows” and “arrows”), and region nested within ballot paper design (2 regions within “no arrows” and six regions within “arrows”). The analysis of variance gives direct indications of the significance of the difference, if any, between the two designs of ballot paper and of the differences among the regions *after* the effect of ballot paper design has been removed. The values in the last two columns in the table (F-distribution probabilities for the variance ratios) indicate the statistical significance of the effects of these two factors; the smaller these values, the more significant the differences. Conventionally ‘significant’ values are shown in bold. No standard errors or standard errors of differences are presented for the calculated means because the variables that are percentage values were transformed to logits before analysis and the logit values are not presented here.

Analysis of the **numbers** of rejected ballot papers must be interpreted with great care because of the differences in constituency electorate and in constituency turnout (**number** of voters) among the electoral regions. For example, the average electorate of the constituencies in the Glasgow electoral region is nearly 10,000 less than that for the constituencies in the Lothians electoral region, and the average constituency turnout was 11,300 less in the Glasgow region than in the Lothians region. These confounding effects can be removed by considering the **percentages** of rejected ballot papers in relation to **percentage** turnout.

While the all-Scotland data may appear to show a significant negative relationship between the percentage rejected ballot papers and the percentage turnout (first chart below), this is highly dependent on a few anomalous constituencies. Five of the Glasgow constituencies are well separated from the cluster of points for the other 68 constituencies. If these five constituencies are excluded, there is no significant relationship at all between percentage turnout and percentage rejected regional ballot papers (second chart below). Similar effects apply to the association between percentage turnout and percentage rejected constituency ballot papers. The relation with percentage turnout will have to be analysed taking into account the effects both of regions and of anomalous constituencies within regions.



The analyses of percentage rejected regional ballot papers and percentage rejected constituency ballot papers (after transformation to logits) show that there were very highly significant differences ($P < 0.001$) both between the ballot paper designs (“no arrows” versus “arrows”) and among electoral regions within the ballot paper designs (“Glasgow” versus “Lothians” within the “no arrows” design, and among the other six regions within the “arrows” design). The significant difference between the two designs points clearly to a factor that is likely to have contributed to the larger percentages of rejected ballot papers in the Glasgow and Lothians electoral regions. The significant differences among electoral regions (after the effect of ballot paper design had been accounted for), indicate the need for a structured approach to the analysis and interpretation of the data to take account of these regional differences.

The most common single cause of rejection of the Scottish Parliament ballot papers seen at the Edinburgh Counting Centre (personal observation) and at the Glasgow Counting Centre (personal communication from an Accredited Observer) was two Xs marked in the regional vote column and no mark at all in the constituency vote column. Such markings would cause both ballot papers on the combined ballot sheet to be rejected, giving rise to a 1 : 1 ratio for the percentages of rejected regional and constituency ballot papers. However, it can be seen from the data in the table on page 4 that there were significant differences in this ratio among the electoral regions. The Glasgow, Lothians and North East Scotland electoral regions showed the largest deviations from the 1 : 1 ratio, with substantial “excesses” of rejected constituency ballot papers. It is thus clear that other factors were involved and that the influence of these factors was different in the electoral regions across Scotland. In all, there were ten constituencies in Scotland where the numbers of rejected constituency ballot papers were less than the numbers of rejected regional ballot papers.

These differences in the relationships between percentage rejected constituency ballot papers and percentage rejected regional ballot papers are illustrated in the charts on pages 5, 6 and 7. It would be tempting to fit one simple regression to the all-Scotland data shown in the chart on page 5, but that would be misleading because it would fail to take account of the differences among the electoral regions and of the differences among constituencies within some electoral regions. While it would be reasonable to suggest there was a strong positive trend in the data for the Glasgow, Lothians, Mid-Scotland and Fife and North East Scotland electoral regions, the overall trend in the Highlands and Islands electoral region appears to be negative. These regional differences must be taken fully into account in any robust analyses of these data and possible contributory factors.

The charts also show that there are some ‘outliers’ among the constituencies within some electoral regions. In the Glasgow electoral region, for example, the Govan constituency is clearly an ‘outlier’ from the general trend in the other nine constituencies, i.e. the percentage of rejected constituency ballot papers in the Govan constituency is well below expectation based on the percentage rejected regional ballot papers. Possible reasons for this difference have been explored in a separate report on the Glasgow constituencies.

The table on page 4 also includes regional averages for the age structure and qualification level of the respective populations, based on the data for Scottish Parliamentary constituencies in the SCROL database (Census 2001). There are some highly significant differences in these variables. These differences **may** indicate factors that could have contributed to some of the differences in rejected ballot papers. Data on many other sociological variables are available in the SCROL database and analysis of some of these may also indicate possible contributory factors. However, any such analyses will almost certainly require the use of more advanced regression techniques such as Generalised Linear Models (GLM) and Hierarchical Generalised Linear Models (HGLM). These techniques provide robust analyses of percentage data (and other data that do not conform to the ‘Normal’ distribution) and are appropriate in situations where there may be several sources of error variation.

Analysis of Variance

Regional Averages over Constituencies within Electoral Regions

Region	Glasgow	Lothians	Central Scot	H & I	M-S & Fife	NES	South Scotland	West Scotland	F. prob. Ballot paper design	F. prob. Region within bp design
BP Design Constituencies	No arrows 10	No arrows 9	Arrows 10	Arrows 8	Arrows 9	Arrows 9	Arrows 9	Arrows 9		
Electorate	47,759	57,679	55,745	42,224	57,049	56,296	56,123	52,786	0.625	0.003
Turnout (total ballot papers)	21,567	32,904	29,333	23,910	31,076	29,510	31,646	30,682	0.095	<0.001
% Turnout	45.0	57.1	52.5	57.3	54.4	52.2	56.5	57.7	<0.001	<0.001
Regional Parties	23	23	16	16	16	15	16	18	-	-
Constituency Candidates	5.0	4.3	4.9	4.4	4.4	4.3	4.4	4.8	0.554	0.327
Rejected Regional BP	900	1009	881	688	733	621	878	885	<0.001	<0.001
Rejected Constituency BP	1693	1711	1088	810	938	1014	1003	1039	<0.001	0.010
% Rejected Regional BP	4.28	3.09	3.06	3.25	2.36	2.15	2.76	2.95	<0.001	<0.001
% Rejected Constituency BF	8.12	5.24	3.75	3.33	3.10	3.52	3.17	3.49	<0.001	<0.001
Excess CRBP - RRB	793	702	206	122	205	394	125	155	<0.001	0.362
% Excess on Turnout	3.84	2.15	0.69	0.084	0.74	1.37	0.41	0.54	<0.001	0.015
CRBP / RRB	1.92	1.70	1.25	1.11	1.31	1.66	1.20	1.18	<0.001	0.034
Mean Age	38.1	38.0	38.1	40.2	39.5	38.9	40.4	39.2	<0.001	0.003
Median Age	36.1	36.0	37.4	40.3	39.3	37.9	40.4	38.9	<0.001	0.017
% Aged 18 - 24	10.8	10.5	8.4	6.4	8.1	10.0	6.7	7.9	<0.001	0.060
% Aged 25 - 64	52.5	54.5	54.4	54.1	53.3	53.4	53.8	53.6	0.492	0.155
% Aged 65 or over	15.8	14.6	14.5	17.1	16.6	15.8	17.5	16.1	0.060	0.031
% No Qualifications	40.8	27.0	37.0	33.5	31.5	29.8	36.6	32.1	0.926	<0.001
% Qualifications Group 1	21.4	23.4	26.6	26.2	25.4	26.0	25.4	24.1	<0.001	0.701
% Qualifications Group 2	14.4	17.1	15.1	15.1	15.8	16.2	14.3	16.3	0.970	0.042
% Qualifications Group 3	6.1	6.2	7.5	5.9	7.7	7.4	6.3	7.9	<0.001	<0.001
% Qualifications Group 4	17.3	26.3	13.9	19.3	19.7	20.6	17.4	19.6	0.187	0.006

Qualifications of people aged 16 - 74: highest level of Qualification is defined as:

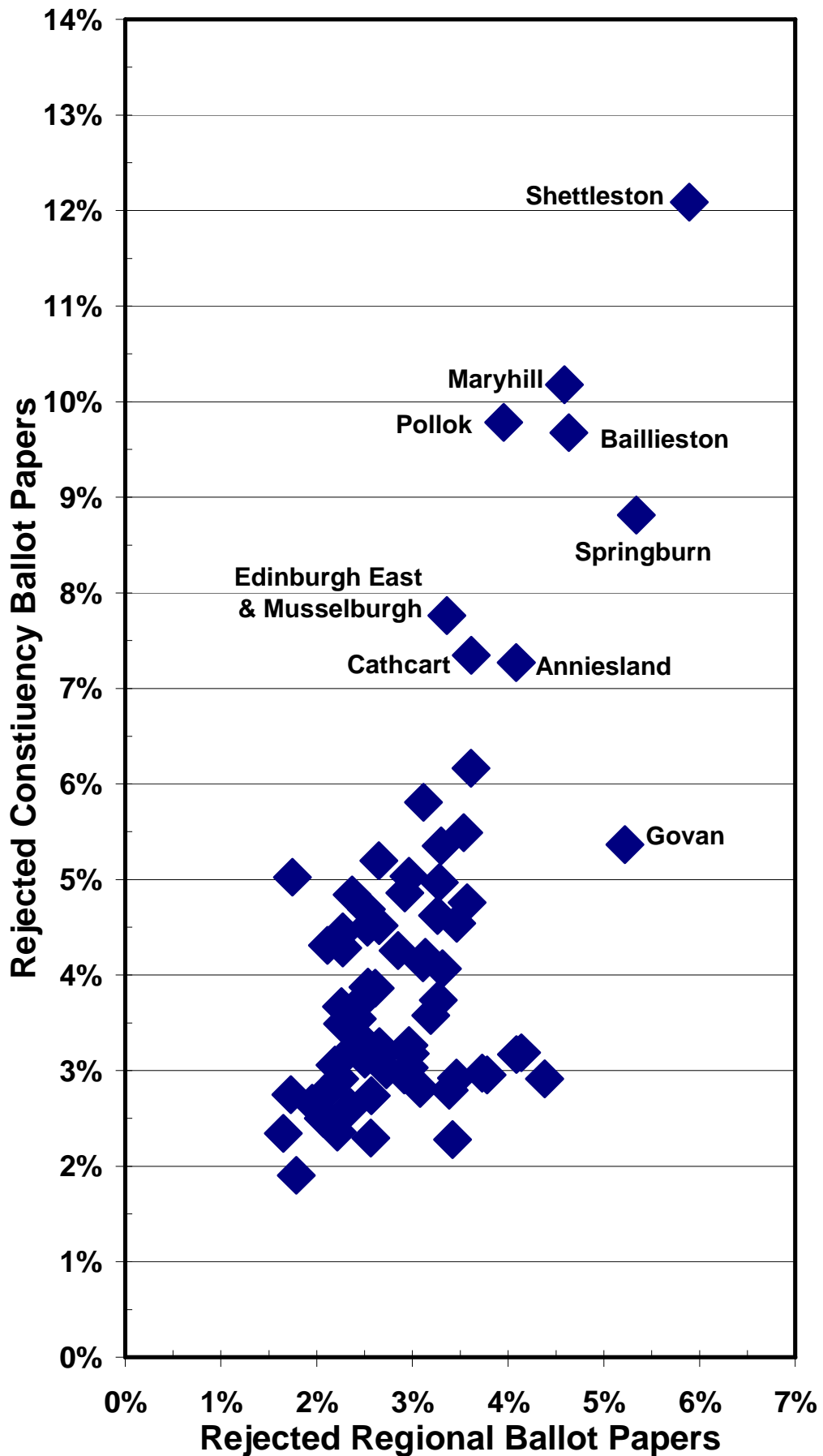
Group 1: 'O' Grade, Standard Grade, Intermediate 1, Intermediate 2, City and Guilds Craft, SVQ level 1 or 2, or equivalent.

Group 2: Higher Grade, CSYS, ONC, OND, City and Guilds Advanced Craft, RSA Advanced Diploma, SVQ level 3 or equivalent.

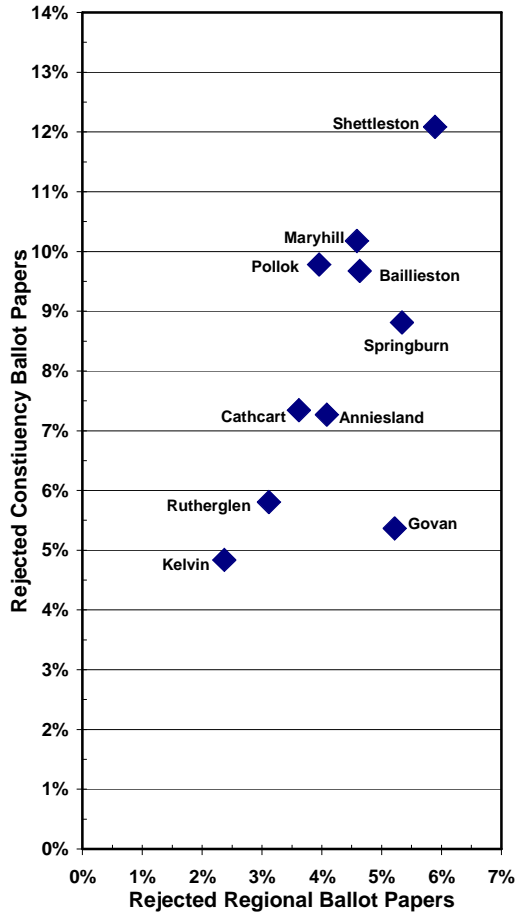
Group 3: HND, HNC, RSA Higher Diploma, SVQ level 4 or 5, or equivalent.

Group 4: First Degree, Higher Degree, Professional Qualification.

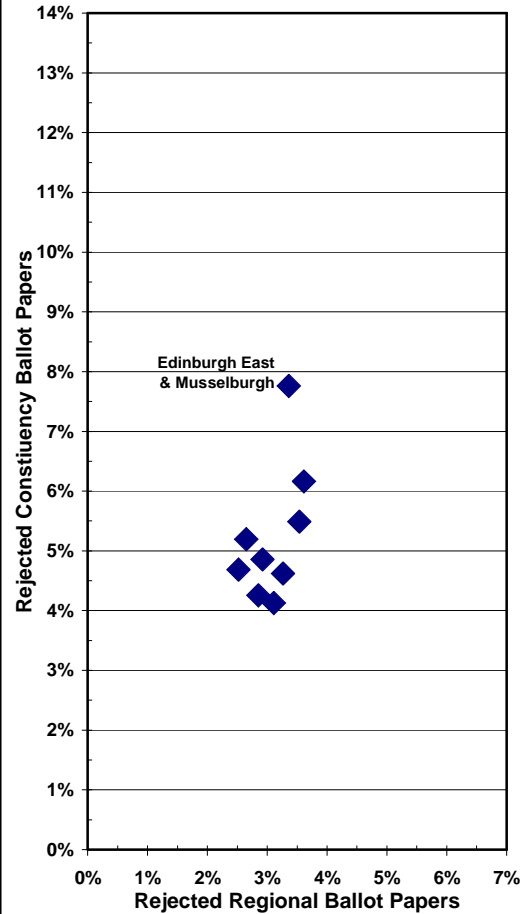
Scottish Parliament Elections 2007 Percentage Rejected Ballot Papers



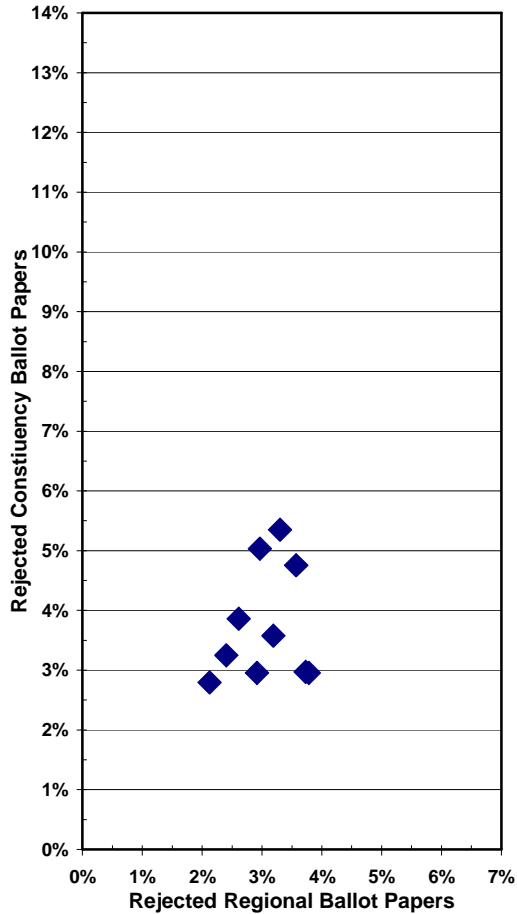
Glasgow Constituencies 2007
Percentage Rejected Ballot Papers



Lothians Constituencies 2007
Percentage Rejected Ballot Papers



Central Scotland 2007
Percentage Rejected Ballot Papers



Highlands & Islands 2007
Percentage Rejected Ballot Papers

